

## InterICE

# Report from the U.S. National Ice Core Laboratory for InterICE.

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- 1. Field Procedure:** In the past, U.S. cores have been received from drillers and logged by contract-hire temporary workers. In future, we plan to have this work done by NICL personnel or by longer-term employees. We plan to modernize our procedures in the field, for removal of drilling fluid, logging, photographing, storage (equilibration of brittle core), containerizing for transport, and design of the field buildings. NICL staff employees will have more direct field responsibility for these kinds of core curation in the field.
- 2. Accession Procedure:** NICL is funded by the U.S. National Science Foundation and Geological Survey. It accepts and stores cores of meteoric ice, that have been drilled by those two agencies, mostly in Antarctica and Greenland. Cores are accepted with extensive documentation about drilling, site location, etc. We do not keep any cores of sea ice or sediments.
- 3. Storage Procedure:** Cores are stored in the  $-36^{\circ}\text{C}$  main storage room. They are enclosed in plastic sleeves (stapled closed or heat sealed), inside aluminized cardboard tubes, on open racks. Fans run continuously in main storage to prevent temperature stratification of room air. Heat exchanger boxes are closed, by means of movable doors, during defrosting, to minimize entropy. Refrigeration is by a freon (R22) system, using reciprocating compressors.
- 4. Curation Procedure:** The NICL collection is tracked by a database, which lists locations, drilling history, cutting and sampling history, distributions of samples, and inventory remaining in the collection. Updated inventory is currently being performed. Current inventory is available on the NICL website <http://nicl.usgs.gov/> Samples are stored in individual tubes with documentation that includes all subsequent sampling. All samples are clearly labeled with the basic information of hole, tube #, top depth, bottom depth, and orientation.

Sample preservation is encouraged by using sealed bags as opposed to stapled closure as our storage facility environment encourages ablation through constant removal of water vapor through defrost cycles.

- 5. Deaccession Strategies:** When older cores are superseded by newer, better quality, better documented cores, or if cores may have been stored under suspicious conditions (viz., before coming to NICL), the criteria for taking samples from them may be relaxed. Later, such cores may be removed from the collection. The expanded list of uses for using samples from such cores include experimental large-sample-mass needs, giving samples of the cores to schools, and scientific pilot studies to refine procedures. The classification of cores as “deaccessed” has been approved by the governing board, the “Ice Core Working Group”. This board is composed of research scientists who have limited-time terms as members.
- 6. Processing ice cores:** Cores are transported from field to lab before any cutting or other processing (exceptions: n-butyl acetate drilling fluid, if used, is removed in the field; and a few samples are taken for determination of physical properties). The cores are stored in the  $-36^{\circ}\text{C}$  main storage room. For processing, they are brought into the  $-26^{\circ}\text{C}$  Examination Room of the lab and usually allowed to equilibrate overnight to the new temperature. A small piece (“slab”) is removed by horizontal bandsaw, cutting parallel to the core axis. The flat surface is smoothed by a planing machine. Electroconductivity measurements are done on that smoothed surface. Visual stratigraphy is performed on a collimating-light table. Further bandsaw cuts are made, by various cutting schemes, to provide samples for the distinctive needs of analysis for isotopes, major elements, trace metals, etc. Subsequent sampling is performed for gas sampling, according to the initial findings. An archive sector is retained in most cases. Extremely sensitive sampling is performed in a Class 100 clean room that is maintained at  $-26^{\circ}\text{C}$ .
- 7. Shipping:** Shipping of samples of core is done routinely to labs throughout the U.S. and other countries. Insulated boxes are used, some with urethane foam insulation, some with evacuated panels. The boxes contain ice samples, eutectic bags, and small temperature loggers. Before shipping, these are kept open overnight in the  $-36^{\circ}\text{C}$  freezer (“cold soaking”). Shipping is by overnight courier with “tracking” capability (usually FedEx, but other carriers have been

successful), avoiding weekends and busy holiday shipping times. Larger shipments (e.g., whole new cores) are brought to the Lab by refrigerated truck, in some cases accompanied by a second, empty truck in case of mechanical or refrigeration malfunction. Dispatches and arrivals are confirmed by telephone and e-mail.